

WHAT IS CLAIMED IS:

1. A semiconductor device, comprising:

a semiconductor substrate including a circuit
element-forming region and a plurality of connection
pads;

an insulating film formed on said circuit element-
forming region;

a columnar electrode electrically connected to at
least one of said plural connection pads; and

at least one thin film passive element including
at least one conductive layer formed on said insulating
film.

2. The semiconductor device according to claim 1,
wherein said thin film passive element is at least one
capacitance element.

3. The semiconductor device according to claim 2,
wherein said capacitance element includes
two conductive layers and a dielectric material layer,
said two conductive layers stacked one upon the other
on said insulating film, and said dielectric material
layer is interposed between the conductive layers.

4. The semiconductor device according to claim 2,
wherein said capacitance element includes
two conductive layers and a dielectric material layer,
said two conductive layers positioned apart from each
other on said insulating film, and said dielectric
layer is formed in the clearance between the two

adjacent conductive layer.

5 5. The semiconductor device according to claim 2,
wherein said capacitance element includes two
conductive layers and a dielectric material layer, said
two conductive layers positioned adjacent to and apart
from each other on said insulating film and plate-like
electrodes positioned on the conductor layers, and said
dielectric material layer is formed in the clearance
between one end the opposite ends of the adjacent
10 plate-like electrodes.

6. The semiconductor device according to claim 1,
wherein said thin film passive element is at least one
inductance element.

15 7. The semiconductor device according to claim 6,
wherein said inductance element includes one conductive
layer, said conductive layer is formed in the shape of
any of an angular eddy shape, a rectangular wave shape,
and a loop shape.

20 8. The semiconductor device according to claim 7,
wherein said inductance element further comprises a
magnetic film formed on said conductive layer.

25 9. The semiconductor device according to claim 1,
wherein said thin film passive element includes two
terminal electrodes, at least one of said two terminal
electrodes of said thin film passive element being
electrically connected to said columnar electrode.

10. The semiconductor device according to claim 1,

wherein said thin film passive element includes two terminal electrodes, at least one of said two terminal electrodes of said thin film passive element being electrically connected to said connection pad.

5 11. The semiconductor device according to claim 1,
wherein said thin film passive element includes two terminal electrodes, each of said terminal electrodes of said thin film passive element being electrically connected to at least one of said connection pad and
10 said columnar electrode.

12. The semiconductor device according to claim 1, wherein the periphery of said thin film passive element is covered with a protective film.

13. The semiconductor device according to claim 1,
15 which further includes a plurality of said thin film passive elements.

14. A method of manufacturing a semiconductor device comprising:

preparing a semiconductor wafer substrate
20 including a plurality of chip forming regions each having a circuit element-forming region and a plurality of connection pads;

forming an insulating film on the circuit element-forming region of each of said chip forming regions;

25 forming at least one thin film passive element including at least one conductive layer on said insulating film;

forming a columnar electrode electrically connected to at least one of said plural connection pads; and

dividing said semiconductor wafer substrate into
5 individual chip forming regions so as to form a plurality of semiconductor devices each having at least one thin film passive element.

15. The method of manufacturing a semiconductor device according to claim 14, wherein said forming of
10 said thin film passive element comprises forming at least one of forming a capacitance element.

16. The method of manufacturing a semiconductor device according to claim 15, wherein said forming of a capacitance element comprises:

15 forming a first conductive layer on the circuit element-forming region of said semiconductor substrate with an insulating film interposed therebetween;

forming a dielectric material layer on said first conductive layer; and

20 forming a second conductive layer on said dielectric material layer.

17. The method of manufacturing a semiconductor device according to claim 15, wherein said forming of the capacitance element comprises:

25 forming two pieces of conductive layer positioned adjacent to each other a predetermined distance apart from each other on said insulating film; and

forming a dielectric material layer in the clearance between adjacent two pieces of said conductive layer.

18. The method of manufacturing a semiconductor device according to claim 15, wherein said forming of the capacitance element comprises:

forming two pieces of the conductive layer positioned adjacent to each other a predetermined distance apart from each other on said insulating film;

forming a plate-like electrode on each of the two adjacent pieces of said conductive layer; and

forming a dielectric material layer in the clearance between one end and the other end of said plate-like electrodes.

19. The method of manufacturing a semiconductor device according to claim 14, wherein said forming of said thin film passive element comprises forming at least one inductance element.

20. The method of manufacturing a semiconductor device according to claim 19, wherein said forming of the inductance element comprises patterning said conductive layer in any of the shapes selected from the group consisting of an angular eddy shape, a rectangular wave shape and a loop shape.

21. The method of manufacturing a semiconductor device according to claim 20, wherein said forming of the inductance element comprises forming a magnetic

film on said conductive layer.

22. The method of manufacturing a semiconductor device according to claim 14, wherein said forming of said thin film passive element comprises covering the periphery of said thin film passive element with a protective film.

23. The method of manufacturing a semiconductor device according to claim 14, wherein said forming of said thin film passive element comprises forming said columnar electrode in at least one of the electrode terminals at one end and the other end of said thin film passive element.

24. The method of manufacturing a semiconductor device according to claim 14, wherein said forming of said thin film passive element comprises connecting at least one of the electrode terminals at one end and the other end of said thin film passive element to said connection pad.

25. The method of manufacturing a semiconductor device according to claim 14, wherein said forming of said thin film passive element comprises connecting each electrode terminal of said thin film passive element to at least one of said connection pad and said columnar electrode.